

## Claims

1. A method for self-tuning an L-C filter resonant circuit comprising  
A phase-frequency detector with a fixed reference frequency input and a frequency-divided oscillator input. The output of the phase detector is connected to  
A digital loop filter whose output is connected to  
A digital-to-analog converter that generates a voltage to tune the capacitors of  
An L-C filter that is the load of the active transconductors of a VCO and the load of a transconductance amplifier,  
A transconductance amplifier that amplifies and filters an input signal.  
A frequency divider whose output connects to an input of the phase detector.
2. The method of claim 1 wherein the tunable capacitors are based on varactors.
3. The method of claim 1 wherein the tunable capacitors are based on MOS capacitors.
4. The method of claim 1 wherein the inductors are based on on-chip spiral inductors.
5. The method of claim 1 wherein the inductors are based on bonding wires.
6. The method of claim 1 wherein the L-C filter is a ladder type.

7. The method of claim 1 wherein the L-C filter is a two-pole resonant circuit.
8. The method of claim 1 wherein the L-C filter forms a band-pass filter.
9. The method of claim 1 wherein the L-C filter is used in a radio frequency system.
10. The method of claim 1 wherein the circuits are implemented in a CMOS technology.
11. The method of claim 1 wherein the circuits are implemented in a bipolar technology.
12. The method of claim 1 wherein the circuits are implemented in other semiconductor process technologies.
13. The method of claim 1 wherein the digital loop filter is implemented by a digital counter.
14. The method of claim 1 wherein the L-C filter includes resistors.
15. The method of claim 1 wherein the number of capacitor elements in the L-C filter are  $N$ , where  $N$  is an integer.
16. The method of claim 1 wherein the number of inductor elements in the L-C filter are  $M$ , where  $M$  is an integer.
17. The method of claim 1 wherein the number of resistor elements in the L-C filter are  $J$ , where  $J$  is an integer.
18. The method of claim 1 wherein the tuning voltage is used to control multiple L-C filter networks.
19. The method of claim 1 wherein the circuits are fully differential.
20. The method of claim 1 wherein the circuits are single-ended.